DROUGHT MITIGATION USING RAINWATER HARVESTING IN THE DRY ZONE OF SRI LANKA

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE MASTER OF ENGINEERING DEGREE IN ENVIRONMENTAL WATER RESOURCES ENGINEERING AND MANAGEMENT, 2004

DEPARTMENT OF CIVIL ENGINEERING

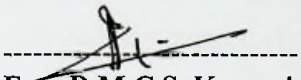
UNIVERSITY OF MORATUWA

SRI LANKA

SEPTEMBER 2008

DECLARATION BY THE CANDIDATE

I declare that the work included in this dissertation, in part or whole has not been previously presented for any other academic qualification at any institution for a higher degree.



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September 2008

ACKNOWLEDGMENT

I would like to express my sincere gratitude to the following who have contributed directly and indirectly to the completion of this study.

To my guide (Eng) Prof. S.S. Wickramasuriya for offering this thesis topic, which provide a challenging experience and for his valuable guidance and inspiration made throughout the study.

Together with course coordinator Dr. Nimal Priyantha and other staff members of postgraduate studies of Environmental water resources Engineering and management, Faculty of Engineering, University of Moratuwa, Sri Lanka and other staff members who served as committee members and for the interest taken in my work and their availability, valuable suggestions and advice.

To the General Manager (Mr.K.L.LPremanath), Deputy General Manager (Mr.D.U.Sumenasekera,), Assistant General Managers (Mr. R.S.Liyanage & Mr. K.S.K. Ranasinghe), from National Water Supply & Drainage Board and Senior Engineer (Mr. Abu Ubaiddha) from consulting Organization for their advice, financial assistance, encouragement and guidance.

I feel short of words to acknowledge to my beloved husband Eng. R.K.W.K. Ranasinghe, my mother, and all family members for their encouragement.

Finally, I would like to dedicate this work in the memory of my late loving father D.M.A. Dissanayaka.

ABSTRACT

The government of Sri Lanka proposed to provide safe drinking water to all by 2025. However, this proposal is becoming a challenging task due to depletion and pollution of water resources combined with a growing demand and conflict among users. On the other hand, pipe borne water to all households is becoming costly due to the high level of investment required and increased operation & maintenance cost. Due to this situation, a large percentage of the both urban and rural population would be deprived of any form of safe drinking water. Therefore it becomes nationally important to look for low cost options which could be managed and afforded by the communities themselves. A rainwater based water supply system is an alternative option to solve this problem.

The objective of this research work is to investigate the more suitable storage volume required for rooftop rainwater harvesting system and determine the probability of success of practicing rainwater harvesting for domestic use in the dry zone of Sri Lanka.

The analysis uses thirty years of daily rainfall data (1968-1998) from Puttalam, Hambantota and Anuradhapura districts in the dry zone of Sri Lanka. The results show that the probability of success of a rainwater harvesting system shows a bimodal pattern during the year.

It has been found that the more suitable tank capacity required is 5 m^3 corresponding to a roof area between 75m^2 to 100 m^2. Such a system can provide 120 liters per capita per day to a household of five persons and give an overall probability of success of approximately 30%. At 300 liters per day per household (ie. 50% of demand), the probability of success improves significantly to 50%.Thus rainwater harvesting can be a valuable tool of drought mitigation within the dry zone. The probability of success of a system varies throughout the year due to the seasonal variation of rainfall. In particular, during the period February to March and June to September a rainwater harvesting system alone will not be able to meet the required demand. The percentage saving of monthly water bills for urban schemes can vary from 25% - 33% considering the subsidy given by NWS & DB, and for consumers in rural schemes the amounts are 25% - 35%. These rainwater harvesting systems utilize 5 m^3 – 7.5 m^3 tank capacities with 75 m^2 – 100 m^2 roof areas.

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ABBREVIATIONS

ADB	*-Asian Development Bank*
AGM	*- Assistant General Manager*
CBO	*-Community Based Organization*
CWSSP	*- Community Water Supply and Sanitation Project*
Lpd	*- Liters per day*
Lpcd	*- Liters per capita per day*
NGO	*- Non Government Organization*
NWS&DB	*- National Water Supply and Drainage Board*
RW	*- Rainwater*
RWH	*- Rainwater Harvesting*
RWHS	*- Rainwater harvesting system*
RWT	*- Rainwater Tank*
TC	*- Tank Capacity*